

SEQUENCE LISTING

<110> King, Te Piao

<120> CLONING AND RECOMBINANT PRODUCTION OF POLISTINAE VENOM ENZYMES,
SUCH AS PHOSPHOLIPASE AND HYALURONIDASE, AND IMMUNOLOGICAL
THERAPIES BASED THEREON

<130> 02313/100F138-US2

<140> TBA

<141> 2003-10-17

<150> US 09/806,658

<151> 2001-03-30

<150> PCT/US99/23211

<151> 1999-10-01

<150> US 09/166,205

<151> 1998-10-01

<160> 12

<170> PatentIn version 3.2

<210> 1

<211> 1048

<212> DNA

<213> Polistes annularis

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cgagatggta ttattcttaa gaaagaaact ttaacgaatt acgatctgtt tacaaagtct	180
acaatatcaa aacaagttgt atttcttata catgggtttcc tttcaactgg gaataatgaa	240
aacttcgttg ctatgtcgaa agctttaata gaaaaagatg attttcttgt aatttcggtc	300
gactggaaga agggtgcttg taatgctttt gcttcaacaa aggatgcttt gggttattcc	360
aaagccgttg gaaacacacg tcacgttgga aaatttgtag ctgattttac aaaactactt	420
gtagaaaaat ataaagtgct gatatcaa atacgattga tcgggcatag tttgggcgcg	480
catacttcag gttttgcggg aaaagaagtt caaaagttaa aattaggaaa atacaaggaa	540
attatcgggc ttgatcctgc tggaccgtat tttcatcgga gtgactgtcc ggacagactt	600
tgcgtaacag acgcagaata tgttcaagtt atacatacat caatcatatt aggagtatat	660
tataatgttg gtagcgttg tttctacgtg aattatggaa aaaatcaacc tggttgcaat	720
gaaccatcct gctctcatag gaaagccgtg aaatatctga ctgagtgc ataaaacatgaa	780
tggtgtttta ttggaacacc atggaagaaa tatttcagca ctccaaaacc aatttcccag	840
tgcagaggag acacctgtgt ttgcgttgga ttgaatgcaa aaagttatcc tgctagaggc	900

gcattttatg caccggttga agcaaattgca ccttattgcc ataacgaggg gattaaactt 960
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 aaacgaacag tcaaataaaaa aaaaaaaaaa 1048

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 <213> Polistes annularis

<400> 2

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Asn Arg Gly Met Ser Pro Asp Cys Thr Phe Asn Glu Lys Asp Ile Val
 20 25 30

Phe Tyr Val Tyr Ser Arg Asp Lys Arg Asp Gly Ile Ile Leu Lys Lys
 35 40 45

Glu Thr Leu Thr Asn Tyr Asp Leu Phe Thr Lys Ser Thr Ile Ser Lys
 50 55 60

Gln Val Val Phe Leu Ile His Gly Phe Leu Ser Thr Gly Asn Asn Glu
 65 70 75 80

Asn Phe Val Ala Met Ser Lys Ala Leu Ile Glu Lys Asp Asp Phe Leu
 85 90 95

Val Ile Ser Val Asp Trp Lys Lys Gly Ala Cys Asn Ala Phe Ala Ser
 100 105 110

Thr Lys Asp Ala Leu Gly Tyr Ser Lys Ala Val Gly Asn Thr Arg His
 115 120 125

Val Gly Lys Phe Val Ala Asp Phe Thr Lys Leu Leu Val Glu Lys Tyr
 130 135 140

Lys Val Leu Ile Ser Asn Ile Arg Leu Ile Gly His Ser Leu Gly Ala
 145 150 155 160

His Thr Ser Gly Phe Ala Gly Lys Glu Val Gln Lys Leu Lys Leu Gly
 165 170 175

Lys Tyr Lys Glu Ile Ile Gly Leu Asp Pro Ala Gly Pro Tyr Phe His
 180 185 190

Arg Ser Asp Cys Pro Asp Arg Leu Cys Val Thr Asp Ala Glu Tyr Val
195 200 205

Gln Val Ile His Thr Ser Ile Ile Leu Gly Val Tyr Tyr Asn Val Gly
210 215 220

Ser Val Asp Phe Tyr Val Asn Tyr Gly Lys Asn Gln Pro Gly Cys Asn
225 230 235 240

Glu Pro Ser Cys Ser His Thr Lys Ala Val Lys Tyr Leu Thr Glu Cys
245 250 255

Ile Lys His Glu Cys Cys Leu Ile Gly Thr Pro Trp Lys Lys Tyr Phe
260 265 270

Ser Thr Pro Lys Pro Ile Ser Gln Cys Arg Gly Asp Thr Cys Val Cys
275 280 285

Val Gly Leu Asn Ala Lys Ser Tyr Pro Ala Arg Gly Ala Phe Tyr Ala
290 295 300

Pro Val Glu Ala Asn Ala Pro Tyr Cys His Asn Glu Gly Ile Lys Leu
305 310 315 320

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tggaacgttg ctacctttat gtgccaccaa tatggcatga atttcgacga ggtgacagat 180
tttaatatca aacataattc taaggacaat tttcgcggtg aaactatatc aatttattac 240
gatcctggaa aattttccagc attgatgcca ctaaaaaatg gtaattatga ggaaagaaac 300
ggaggggttc ctcagcgagg taacatcacg atacatttgc aacaatttaa cgaagatttg 360
gataaaatga caccggataa aaatttcggt ggtatcggtg taatcgattt cgaaagatgg 420
aaaccgattt tccgacagaa ttggggtaac acggaaatac ataagaaata ttctattgaa 480
ctcgttcgga aagaacatcc aaagtggagc gaatcgatga tcgaagcgga agctacgaaa 540
aagttcgaga aatatgagag atatttcatg gaagaaactt tgaaattggc aaaaaagact 600
aggaaaaggg ctaagtgggg ttattacgga tttccttact gctataacgt aacaccgaat 660

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aatcctggcc cggattgcga tgctaaagcg acaatcgaga acgatagact gtcgtggatg      720
tacaataatc aagaaatact ttttccatcc gtctacgtga gacatgaaca aaaaccggag      780
gaaaggggttt acctagtgcga aggtagaatt aaagaagctg ttaggatatc gaataattta      840
gaacattcac ctagtgtgct tgcttattgg tggtagctgt atcaggacaa gatggacatt      900
tacctaagcg agaccgacgt ggaaaagact ttccaagaga tagtgactaa tgggtggggat      960
ggtatcataa tatggggtag ctcggtccgat gttaacagcc taagtaaata taagagattg     1020
agagagtacc tgtaaacaac tttaggaccg ttcgcgggta atgtaacaga aactgtcaac     1080
ggaagatcat ccctaaactt ctaaaataat cgataacgcc taatcacgtc gatgatgatt     1140
attaggggtgt tcttcgggtga ttgggttgat ctcaactgaaa agacttttctg ttaaaaaaca     1200
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<210> 4
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<212> PRT
<213> Polistes annularis

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<400> 4

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Tyr Val Ser Leu Ser Pro Asp Ser Val Phe Asn Ile Ile Thr Asp Asp
1          5          10          15

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Ile Ser His Gln Ile Leu Ser Arg Ser Asn Cys Glu Arg Ser Lys Arg
          20          25          30

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Pro Lys Arg Val Phe Ser Ile Tyr Trp Asn Val Pro Thr Phe Met Cys
          35          40          45

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His Gln Tyr Gly Met Asn Phe Asp Glu Val Thr Asp Phe Asn Ile Lys
          50          55          60

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His Asn Ser Lys Asp Asn Phe Arg Gly Glu Thr Ile Ser Ile Tyr Tyr
65          70          75          80

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Asp Pro Gly Lys Phe Pro Ala Leu Met Pro Leu Lys Asn Gly Asn Tyr
          85          90          95

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Glu Glu Arg Asn Gly Gly Val Pro Gln Arg Gly Asn Ile Thr Ile His
          100          105          110

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Leu Gln Gln Phe Asn Glu Asp Leu Asp Lys Met Thr Pro Asp Lys Asn
          115          120          125

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Phe Gly Gly Ile Gly Val Ile Asp Phe Glu Arg Trp Lys Pro Ile Phe
130 135 140

Arg Gln Asn Trp Gly Asn Thr Glu Ile His Lys Lys Tyr Ser Ile Glu
145 150 155 160

Leu Val Arg Lys Glu His Pro Lys Trp Ser Glu Ser Met Ile Glu Ala
165 170 175

Glu Ala Thr Lys Lys Phe Glu Lys Tyr Ala Arg Tyr Phe Met Glu Glu
180 185 190

Thr Leu Lys Leu Ala Lys Lys Thr Arg Lys Arg Ala Lys Trp Gly Tyr
195 200 205

Tyr Gly Phe Pro Tyr Cys Tyr Asn Val Thr Pro Asn Asn Pro Gly Pro
210 215 220

Asp Cys Asp Ala Lys Ala Thr Ile Glu Asn Asp Arg Leu Ser Trp Met
225 230 235 240

Tyr Asn Asn Gln Glu Ile Leu Phe Pro Ser Val Tyr Val Arg His Glu
245 250 255

Gln Lys Pro Glu Glu Arg Val Tyr Leu Val Gln Gly Arg Ile Lys Glu
260 265 270

Ala Val Arg Ile Ser Asn Asn Leu Glu His Ser Pro Ser Val Leu Ala
275 280 285

Tyr Trp Trp Tyr Val Tyr Gln Asp Lys Met Asp Ile Tyr Leu Ser Glu
290 295 300

Thr Asp Val Glu Lys Thr Phe Gln Glu Ile Val Thr Asn Gly Gly Asp
305 310 315 320

Gly Ile Ile Ile Trp Gly Ser Ser Ser Asp Val Asn Ser Leu Ser Lys
325 330 335

Cys Lys Arg Leu Arg Glu Tyr Leu Leu Asn Thr Leu Gly Pro Phe Ala
340 345 350

Val Asn Val Thr Glu Thr Val Asn Gly Arg Ser Ser Leu Asn Phe
355 360 365

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 <211> 114
 <212> DNA
 <213> Polistes annularis

<400> 5
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 agaaaaattt ttaaaaatat attactgaag tatgaaataa aaactttata cttt 114

<210> 6
 <211> 127
 <212> DNA
 <213> Polistes annularis

<400> 6
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 tatatcctat gccttggtat atgatttcgg agttagacac tattattttt aaataatttt 120
 tacatta 127

<210> 7
 <211> 317
 <212> PRT
 <213> Dolichovespula maculata

<400> 7

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Arg	Phe	Ser	Val	Cys	Pro	Phe	Ser	Asn	Asp	Thr	Val	Lys	Met	Ile	Phe
			20					25					30		
Leu	Thr	Arg	Glu	Asn	Arg	Lys	His	Asp	Phe	Tyr	Thr	Leu	Asp	Thr	Met
			35				40					45			
Asn	Arg	His	Asn	Glu	Phe	Lys	Lys	Ser	Ile	Ile	Lys	Arg	Pro	Val	Val
			50			55					60				
Phe	Ile	Thr	His	Gly	Phe	Thr	Ser	Ser	Ala	Thr	Glu	Lys	Asn	Phe	Val
65				70						75				80	
Ala	Met	Ser	Glu	Ala	Leu	Met	His	Thr	Gly	Asp	Phe	Leu	Ile	Ile	Met
			85						90					95	
Val	Asp	Trp	Arg	Met	Ala	Ala	Cys	Thr	Asp	Glu	Tyr	Pro	Gly	Leu	Lys
			100					105					110		
Tyr	Met	Phe	Tyr	Lys	Ala	Ala	Val	Gly	Asn	Thr	Arg	Leu	Val	Gly	Asn

115															
Phe	Ile	Ala	Met	Ile	Ala	Lys	Lys	Leu	Val	Glu	Gln	Tyr	Lys	Val	Pro
130						135					140				
Met	Thr	Asn	Ile	Arg	Leu	Val	Gly	His	Ser	Leu	Gly	Ala	His	Ile	Ser
145					150					155					160
Gly	Phe	Ala	Gly	Lys	Arg	Val	Gln	Glu	Leu	Lys	Leu	Gly	Lys	Phe	Ser
				165					170					175	
Glu	Ile	Ile	Gly	Leu	Asp	Pro	Ala	Gly	Pro	Ser	Phe	Lys	Lys	Asn	Asp
			180					185					190		
Cys	Ser	Glu	Arg	Ile	Cys	Glu	Thr	Asp	Ala	His	Tyr	Val	Gln	Ile	Leu
		195					200					205			
His	Thr	Ser	Ser	Asn	Leu	Gly	Thr	Glu	Arg	Thr	Leu	Gly	Thr	Val	Asp
	210					215					220				
Phe	Tyr	Ile	Asn	Asn	Gly	Ser	Asn	Gln	Pro	Gly	Cys	Arg	Tyr	Ile	Ile
225					230					235					240
Gly	Glu	Thr	Cys	Ser	His	Thr	Arg	Ala	Val	Lys	Tyr	Phe	Thr	Glu	Cys
				245					250					255	
Ile	Arg	Arg	Glu	Cys	Cys	Leu	Ile	Gly	Val	Pro	Gln	Ser	Lys	Asn	Pro
			260					265					270		
Gln	Pro	Val	Ser	Lys	Cys	Thr	Arg	Asn	Glu	Cys	Val	Cys	Val	Gly	Leu
		275					280					285			
Asn	Ala	Lys	Lys	Tyr	Pro	Lys	Arg	Gly	Ser	Phe	Tyr	Val	Pro	Val	Glu
	290					295					300				
Ala	Glu	Ala	Pro	Tyr	Cys	Asn	Asn	Asn	Gly	Lys	Ile	Ile			
305					310					315					
<210>	8														
<211>	300														
<212>	PRT														
<213>	Vespula vulgaris														
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Gly	Pro	Lys	Cys	Pro	Phe	Asn	Ser	Asp	Thr	Val	Ser	Ile	Ile	Ile	Glu
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Thr	Arg	Glu	Asn	Arg	Asn	Arg	Asp	Leu	Tyr	Thr	Leu	Gln	Thr	Leu	Gln			
			20					25					30					
Asn	His	Pro	Glu	Phe	Lys	Lys	Lys	Thr	Ile	Thr	Arg	Pro	Val	Val	Phe			
		35					40					45						
Ile	Thr	His	Gly	Phe	Thr	Ser	Ser	Ala	Ser	Glu	Thr	Asn	Phe	Ile	Asn			
	50					55					60							
Leu	Ala	Lys	Ala	Leu	Val	Asp	Lys	Asp	Asn	Tyr	Met	Val	Ile	Ser	Ile			
65					70					75					80			
Asp	Trp	Gln	Thr	Ala	Ala	Cys	Thr	Asn	Glu	Ala	Ala	Gly	Leu	Lys	Tyr			
				85					90					95				
Leu	Tyr	Tyr	Pro	Thr	Ala	Ala	Arg	Asn	Thr	Arg	Leu	Val	Gly	Gln	Tyr			
			100					105					110					
Ile	Ala	Thr	Ile	Thr	Gln	Lys	Leu	Val	Lys	His	Tyr	Lys	Ile	Ser	Met			
		115					120					125						
Ala	Asn	Ile	Arg	Leu	Ile	Gly	His	Ser	Leu	Gly	Ala	His	Ala	Ser	Gly			
	130					135					140							
Phe	Ala	Gly	Lys	Lys	Val	Gln	Glu	Leu	Lys	Leu	Gly	Lys	Tyr	Ser	Glu			
145					150					155					160			
Ile	Ile	Gly	Leu	Asp	Pro	Ala	Arg	Pro	Ser	Phe	Asp	Ser	Asn	His	Cys			
				165					170					175				
Ser	Glu	Arg	Leu	Cys	Glu	Thr	Asp	Ala	Glu	Tyr	Val	Gln	Ile	Ile	His			
			180					185					190					
Thr	Ser	Asn	Tyr	Leu	Gly	Thr	Glu	Lys	Thr	Leu	Gly	Thr	Val	Asp	Phe			
		195					200					205						
Tyr	Met	Asn	Asn	Gly	Lys	Asn	Gln	Pro	Gly	Cys	Gly	Arg	Phe	Phe	Ser			
	210					215					220							
Glu	Val	Cys	Ser	His	Ser	Arg	Ala	Val	Ile	Tyr	Met	Ala	Glu	Cys	Ile			
225					230					235					240			
Lys	His	Glu	Cys	Cys	Leu	Ile	Gly	Ile	Pro	Lys	Ser	Lys	Ser	Ser	Gln			
				245					250					255				

Pro Ile Ser Ser Cys Thr Lys Gln Glu Cys Val Cys Val Gly Leu Asn
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Ala Lys Lys Tyr Thr Ser Arg Gly Ser Phe Tyr Val Pro Val Glu Ser
 275 280 285

Thr Val Pro Phe Cys Asn Asn Lys Gly Lys Ile Ile
 290 295 300

<210> 9
 <211> 94
 <212> DNA
 <213> Polistes annularis

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 ctattgtaaa ttatctatcg attgttttagg caaa 94

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 <211> 347
 <212> PRT
 <213> Apis melliferis

<400> 10

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 20 25 30

Tyr Gly Ile Leu Gln Asn Trp Met Asp Lys Phe Arg Gly Glu Glu Ile
 35 40 45

Ala Ile Leu Tyr Asp Pro Gly Met Phe Pro Ala Leu Leu Lys Asp Pro
 50 55 60

Asn Gly Asn Val Val Ala Arg Asn Gly Gly Val Pro Gln Leu Gly Asn
 65 70 75 80

Leu Thr Lys His Leu Gln Val Phe Arg Asp His Tyr Ile Asn Gln Ile
 85 90 95

Pro Asp Lys Ser Phe Pro Gly Val Gly Val Ile Asp Phe Glu Ser Trp
 100 105 110

Arg Pro Ile Phe Arg Gln Asn Trp Ala Ser Leu Gln Pro Tyr Lys Lys
 115 120 125

Leu Ser Val Glu Val Val Arg Arg Glu His Pro Phe Trp Asp Asp Gln
 130 135 140
 Arg Val Glu Gln Glu Ala Lys Arg Arg Phe Glu Lys Tyr Gly Gln Leu
 145 150 155 160
 Phe Met Glu Glu Thr Leu Lys Ala Ala Lys Arg Met Arg Pro Ala Ala
 165 170 175
 Asn Trp Gly Tyr Tyr Ala Tyr Pro Tyr Cys Tyr Asn Leu Thr Pro Asn
 180 185 190
 Gln Pro Ser Ala Gln Cys Glu Ala Thr Thr Met Gln Glu Asn Asp Lys
 195 200 205
 Met Ser Trp Leu Phe Glu Ser Glu Asp Val Leu Leu Pro Ser Val Tyr
 210 215 220
 Leu Arg Trp Asn Leu Thr Ser Gly Glu Arg Val Gly Leu Val Gly Gly
 225 230 235 240
 Arg Val Lys Glu Ala Leu Arg Ile Ala Arg Gln Met Thr Thr Ser Arg
 245 250 255
 Lys Lys Val Leu Pro Tyr Tyr Trp Tyr Lys Tyr Gln Asp Arg Arg Asp
 260 265 270
 Thr Asp Leu Ser Arg Ala Asp Leu Glu Ala Thr Leu Arg Lys Ile Thr
 275 280 285
 Asp Leu Gly Ala Asp Gly Phe Ile Ile Trp Gly Ser Ser Asp Asp Ile
 290 295 300
 Asn Thr Lys Ala Lys Cys Leu Gln Phe Arg Glu Tyr Leu Asn Asn Glu
 305 310 315 320
 Leu Gly Pro Ala Val Lys Arg Ile Ala Leu Asn Asn Asn Ala Asn Asp
 325 330 335
 Arg Leu Thr Val Asp Val Ser Val Asp Gln Val
 340 345

<210> 11
 <211> 331
 <212> PRT
 <213> Dolichovespula maculata

<400> 11

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Phe	Met	Cys	His	Gln	Tyr	Gly	Leu	Tyr	Phe	Asp	Glu	Val	Thr	Asn	Phe	
			20					25					30			
Asn	Ile	Lys	His	Asn	Ser	Lys	Asp	Asp	Phe	Gln	Gly	Asp	Lys	Ile	Ser	
		35					40					45				
Ile	Phe	Tyr	Asp	Pro	Gly	Glu	Phe	Pro	Ala	Leu	Leu	Pro	Leu	Lys	Glu	
	50					55					60					
Gly	Asn	Tyr	Lys	Ile	Arg	Asn	Gly	Gly	Val	Pro	Gln	Glu	Gly	Asn	Ile	
65					70					75					80	
Thr	Ile	His	Leu	Gln	Arg	Phe	Ile	Glu	Asn	Leu	Asp	Lys	Thr	Tyr	Pro	
			85						90					95		
Asn	Arg	Asn	Phe	Asn	Gly	Ile	Gly	Val	Ile	Asp	Phe	Glu	Arg	Trp	Arg	
			100					105					110			
Pro	Ile	Phe	Arg	Gln	Asn	Trp	Gly	Asn	Met	Met	Ile	His	Lys	Lys	Phe	
		115					120					125				
Ser	Ile	Asp	Leu	Val	Arg	Asn	Glu	His	Pro	Phe	Trp	Asp	Lys	Lys	Met	
	130					135					140					
Ile	Glu	Leu	Glu	Ala	Ser	Lys	Arg	Phe	Glu	Lys	Tyr	Ala	Arg	Leu	Phe	
145					150					155					160	
Met	Glu	Glu	Thr	Leu	Lys	Leu	Ala	Lys	Lys	Thr	Arg	Lys	Gln	Ala	Asp	
				165					170					175		
Trp	Gly	Tyr	Tyr	Gly	Tyr	Pro	Tyr	Cys	Phe	Asn	Met	Ser	Pro	Asn	Asn	
			180					185					190			
Leu	Val	Pro	Asp	Cys	Asp	Ala	Thr	Ala	Met	Leu	Glu	Asn	Asp	Lys	Met	
		195					200					205				
Ser	Trp	Leu	Phe	Asn	Asn	Gln	Asn	Val	Leu	Leu	Pro	Ser	Val	Tyr	Ile	
	210					215					220					
Arg	His	Glu	Leu	Thr	Pro	Asp	Gln	Arg	Val	Gly	Leu	Val	Gln	Gly	Arg	
225					230					235					240	

Val Lys Glu Ala Val Arg Ile Ser Asn Asn Leu Lys His Ser Pro Lys
245 250 255

Val Leu Ser Tyr Trp Trp Tyr Val Tyr Gln Asp Asp Thr Asn Thr Phe
260 265 270

Leu Thr Glu Thr Asp Val Lys Lys Thr Phe Gln Glu Ile Ala Ile Asn
275 280 285

Gly Gly Asp Gly Ile Ile Ile Trp Gly Ser Ser Ser Asp Val Asn Ser
290 295 300

Leu Ser Lys Cys Lys Arg Leu Arg Glu Tyr Leu Leu Thr Val Leu Gly
305 310 315 320

Pro Ile Thr Val Asn Val Thr Glu Thr Val Asn
325 330

<210> 12
<211> 331
<212> PRT
<213> *Vespula vulgaris*

<400> 12

Ser Glu Arg Pro Lys Arg Val Phe Asn Ile Tyr Trp Asn Val Pro Thr
1 5 10 15

Phe Met Cys His Gln Tyr Asp Leu Tyr Phe Asp Glu Val Thr Asn Phe
20 25 30

Asn Ile Lys Arg Asn Ser Lys Asp Asp Phe Gln Gly Asp Lys Ile Ala
35 40 45

Ile Phe Tyr Asp Pro Gly Glu Phe Pro Ala Leu Leu Ser Leu Lys Asp
50 55 60

Gly Lys Tyr Lys Lys Arg Asn Gly Gly Val Pro Gln Glu Gly Asn Ile
65 70 75 80

Thr Ile His Leu Gln Lys Phe Ile Glu Asn Leu Asp Lys Ile Tyr Pro
85 90 95

Asn Arg Asn Phe Ser Gly Ile Gly Val Ile Asp Phe Glu Arg Trp Arg
100 105 110

Pro Ile Phe Arg Gln Asn Trp Gly Asn Met Lys Ile His Lys Asn Phe
115 120 125

Ser Ile Asp Leu Val Arg Asn Glu His Pro Thr Trp Asn Lys Lys Met
130 135 140

Ile Glu Leu Glu Ala Ser Lys Arg Phe Glu Lys Tyr Ala Arg Phe Phe
145 150 155 160

Met Glu Glu Thr Leu Lys Leu Ala Lys Lys Thr Arg Lys Gln Ala Asp
165 170 175

Trp Gly Tyr Tyr Gly Tyr Pro Tyr Cys Phe Asn Met Ser Pro Asn Asn
180 185 190

Leu Val Pro Glu Cys Asp Val Thr Ala Met His Glu Asn Asp Lys Met
195 200 205

Ser Trp Leu Phe Asn Asn Gln Asn Val Leu Leu Pro Ser Val Tyr Val
210 215 220

Arg Gln Glu Leu Thr Pro Asp Gln Arg Ile Gly Leu Val Gln Gly Arg
225 230 235 240

Val Lys Glu Ala Val Arg Ile Ser Asn Asn Leu Lys His Ser Pro Lys
245 250 255

Val Leu Ser Tyr Trp Trp Tyr Val Tyr Gln Asp Glu Thr Asn Thr Phe
260 265 270

Leu Thr Glu Thr Asp Val Lys Lys Thr Phe Gln Glu Ile Val Ile Asn
275 280 285

Gly Gly Asp Gly Ile Ile Ile Trp Gly Ser Ser Ser Asp Val Asn Ser
290 295 300

Leu Ser Lys Cys Lys Arg Leu Gln Asp Tyr Leu Leu Thr Val Leu Gly
305 310 315 320

Pro Ile Ala Ile Asn Val Thr Glu Ala Val Asn
325 330